

CLAIMS

1. A radio communication apparatus at a transmission side that includes a plurality of transmission antennas and performs a communication using at least one carrier, the radio communication
5 apparatus comprising:

a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from a communication apparatus at a reception side; and

10 a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided.

2. The radio communication apparatus according to claim 1,
15 further comprising:

a beam forming unit that performs an individual direction control by a complex multiplication with respect to each of the channels to which the space-time-coding processing is performed, and distributes the channels for each of the transmission antennas; and

20 an adding unit that adds all of the transmission signals to which the direction control is performed corresponding to each of the transmission antennas.

3. A radio communication apparatus at a reception side that
25 includes at least one reception antenna and performs a communication

using at least one carrier, the radio communication apparatus comprising:

a channel estimating unit that estimates a channel for transmission and reception of a signal; and

5 a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of a channel estimation, a physical configuration of a communication apparatus at a transmission side, and a physical configuration of the radio communication apparatus itself, and informs channel structure
10 information that is a result of a determination to the communication apparatus at the transmission side.

4. The radio communication apparatus according to claim 3, wherein the channel-structure determining unit generates the channel
15 structure information based on at least one of the result of the channel estimation, number of antennas of the communication apparatus at the transmission side and the radio communication apparatus itself, and a computational capability of the communication apparatus at the transmission side and the radio communication apparatus itself.

20

5. The radio communication apparatus according to claim 4, further comprising a coherent-band measuring unit that measures a coherent bandwidth at the channel by observing a reception signal, wherein

25 the channel estimating unit divides a signal band into a plurality

of subcarrier groups having same channel information based on a result of a measurement of the coherent bandwidth, and performs the channel estimation in units of a subcarrier group.

5 6. The radio communication apparatus according to claim 5, wherein the channel estimating unit performs the channel estimation for a plurality of subcarriers within the subcarrier group, and averages a result of the channel estimation.

10 7. A radio communication apparatus that includes a plurality of transmission antennas and at least one reception antenna, and performs a communication using at least one carrier, the radio communication apparatus comprising:

 a transmission-processing unit that includes

15 a channel dividing unit that divides a transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from a communication apparatus at a reception side; and

20 a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided; and

 a reception-processing unit that includes

 a channel estimating unit that estimates a channel for
25 transmission and reception; and

a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of a channel estimation, a physical configuration of a communication apparatus at a transmission side, and a physical configuration of the radio communication apparatus itself, and informs channel structure information that is a result of a determination to the communication apparatus at the transmission side.

8. The radio communication apparatus according to claim 7,
wherein the channel-structure determining unit generates the channel structure information based on at least one of the result of the channel estimation, number of antennas of the communication apparatus at the transmission side and the radio communication apparatus itself, and a computational capability of the communication apparatus at the transmission side and the radio communication apparatus itself.

9. The radio communication apparatus according to claim 8,
further comprising a coherent-band measuring unit that measures a coherent bandwidth at the channel by observing a reception signal,
wherein

the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of a measurement of the coherent bandwidth, and performs the channel estimation in units of a subcarrier group.

10. The radio communication apparatus according to claim 9, wherein the channel estimating unit performs the channel estimation for a plurality of subcarriers within the subcarrier group, and averages a result of the channel estimation.

5

11. A transmitter that includes a plurality of transmission antennas and transmits a transmission signal to a receiver using at least one carrier, the transmitter comprising:

10 a channel dividing unit that divides the transmission signal into a plurality of channels based on channel structure information indicating a method of structuring a multiple-input-multiple-output channel informed from the receiver; and

15 a space-time-coding unit that realizes transmission diversity by performing a space-time-coding processing for each of the channels divided.

12. The transmitter according to claim 11, further comprising:

20 a beam forming unit that performs an individual direction control by a complex multiplication with respect to each of the channels to which the space-time-coding processing is performed, and distributes the channels for each of the transmission antennas; and

an adding unit that adds all of the transmission signals to which the direction control is performed corresponding to each of the transmission antennas.

25

13. A receiver that includes at least one reception antenna and receives a signal from a transmitter using at least one carrier, the receiver comprising:

- a channel estimating unit that estimates a channel for
5 transmission and reception of a signal; and
- a channel-structure determining unit that determines a structure of a multiple-input-multiple-output channel based on a result of a channel estimation, a physical configuration of the transmitter, and a physical configuration of the receiver itself, and informs channel
10 structure information that is a result of a determination to the transmitter.

14. The receiver according to claim 13, further comprising a coherent-band measuring unit that measures a coherent bandwidth at
15 the channel by observing a reception signal, wherein

the channel estimating unit divides a signal band into a plurality of subcarrier groups having same channel information based on a result of a measurement of the coherent bandwidth, and performs the channel estimation in units of a subcarrier group.

20

15. The receiver according to claim 14, wherein the channel estimating unit performs the channel estimation for a plurality of subcarriers within the subcarrier group, and averages a result of the channel estimation.

25

16. The receiver according to claim 13, wherein the
channel-structure determining unit generates the channel structure
information based on at least one of the result of the channel
estimation, number of antennas of the transmitter and the receiver itself,
5 and a computational capability of the transmitter and the receiver itself.

17. A radio communication system comprising:
a transmitter that transmits a transmission signal to a receiver
using at least one carrier, the transmitter including
10 a plurality of transmission antennas;
a channel dividing unit that divides the transmission
signal into a plurality of channels based on channel structure
information indicating a method of structuring a
multiple-input-multiple-output channel informed from the receiver; and
15 a space-time-coding unit that realizes transmission
diversity by performing a space-time-coding processing for each of the
channels divided.
a receiver that receives the transmission signal from the
transmitter using at least one carrier, including
20 at least one reception antenna;
a channel estimating unit that estimates a channel for
transmission and reception of a signal; and
a channel-structure determining unit that determines a
structure of a multiple-input-multiple-output channel based on a result
25 of a channel estimation, a physical configuration of the transmitter, and

a physical configuration of the receiver itself, and informs channel structure information that is a result of a determination to the transmitter.